

Wild Food Harvesting and Access by Household and Generation in the Talamanca Bribri Indigenous Territory, Costa Rica

Olivia Sylvester¹ · Alí García Segura² · Iain J. Davidson-Hunt³

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Abstract We contribute to a growing body of literature on wild food harvesting by examining culturally specific relationships with wild food, the extent and frequency of wild food use in forests, and young people's wild food consumption. We gathered qualitative data in the Talamanca Bribri Territory, Costa Rica, using participant observation, interviews, and household surveys. We found that wild food consumption was related to nutrition, health, religious beliefs, identity, dietary variety, and resource availability. Consumption occurred in all households and its frequency depended upon opportunities to harvest and/or access to sharing networks. In all households, younger members consumed wild plants and in most households they also ate wild meat. All households harvested their own plants but not all households harvested their own meat. Consequently, sharing was relatively more common for meat than plants. Lastly, sharing was important for older and younger generations and women who lacked opportunities to harvest food due to health, time, school, and work constraints. Our results can be used to design forest management policies that respect community access to wild food.

Keywords Ethnobiology · Forest food harvesting · Hunting · Food sharing · La Amistad biosphere reserve · Costa Rica

✉ Olivia Sylvester
livosylvester@gmail.com; osylvester@upeace.org

¹ University for Peace, Ciudad Colon PO Box 138-6100, San José, Costa Rica

² Escuela de Filología, Lingüística y Literature, Universidad de Costa Rica, San José, Costa Rica

³ Natural Resources Institute, University of Manitoba, 303-70 Dysart Road, Winnipeg, MB R3T 2M6, Canada

Introduction

Wild foods such as fruits, nuts, sap, roots, leaves, fungi, insects, fish, and game (Pimentel *et al.* 1997), unlike agricultural species, are for the most part uncultivated (Bharucha and Pretty 2010). There are a number of reasons why wild foods are important: they provide immense dietary diversity to the people who use them (Kuhnlein and Turner 1991; Etkin 1994; Grivetti and Ogle 2000; Colfer 2008; Batal and Hunter 2007; Butler 2008); they can mitigate seasonal hunger during resource shortages or pre-harvest seasons (Annegers 1973; Campbell 1987; Zinyama *et al.* 1990; Turner and Davis 1993; Etkin 1994; Huss-Ashmore and Johnston 1994; Senaratne *et al.* 2003; Delang 2006); and they contain important nutrients not often available in commonly consumed foods (Robinson 2014). Nutritionists have found that wild plants and meats provide key micronutrients and key sources of protein that can be lacking in people's regular diets (Grivetti and Ogle 2000; Fa *et al.* 2003; Johns and Maundu 2006; Golden *et al.* 2011; Powell *et al.* 2013). The nutritional importance of wild foods is becoming more salient as rural and agricultural diets increasingly rely on imported processed foods that are high in fat and refined sugar and low in fiber and micronutrients (Damman *et al.* 2008; Kuhnlein *et al.* 2013).

In addition, wild foods can have important cultural and social significance (Kuhnlein and Turner 1991; Somnasang and Moreno-Black 2000; Power 2008). For some Indigenous people for example, wild plant and animal foods are not just sources of nutrition or economic value, but are also regarded as spiritual beings people form relationships with throughout their lives (Power 2008; Sylvester and García Segura 2016). Wild foods are also socially significant because their harvesting and sharing can foster social cohesion and bonding among families and kin networks (Aspelin 1979; Collings *et al.* 1998; Power 2008; Kehoe 2014). Hunting, for example, can bring groups of people

together both for the tracking of wild animals and for the processing and preparation of the meat (Ohmagari and Berkes 1997; Gurven *et al.* 2002, 2004; Tuck-Po 2008; Bliege Bird *et al.* 2012; Rodriguez *et al.* 2012; Sylvester *et al.* 2016a).

Despite broad consensus that wild species can be critical for health and cultural continuity, we lack specific case studies that address three key elements of wild food harvesting: the meaning of wild foods from an emic perspective, i.e., from the perspective of the people using them; the extent of wild food use among contemporary forest dwelling-communities; and lastly, who in households benefits from harvesting and consuming wild foods.

A review of the literature found studies that have quantified the role that a species plays within a culture (e.g., Pieroni 2001), commented on the cultural significance of wild food to indigenous peoples (Power 2008; see also Somnasang and Moreno-Black 2000), and have examined the cultural uses of wild food (e.g., Turner and Clifton 2006; Hadjichambis *et al.* 2008) as well as the ethnoecology of wild food use (e.g., Bye 1981; Turner and Clifton 2006). Within this large body of literature, apart from Somnasang and Moreno-Black's (2000) study of the Isan region in Thailand, none had the explicit goal of documenting the meaning resource users attribute to wild food use.

We also found no studies explicitly addressing the extent of wild food use among contemporary forest-dwelling societies. Scholars have examined many elements of household wild food use such as methods of acquisition, distribution, and consumption (e.g., Daniggelis 2003), the household economic value of wild foods (de Merode *et al.* 2004; Delang 2006), the number of wild plants harvested in different habitats per household (Delang 2006); however, a basic survey of all households in a community to determine how widespread their wild foods use is lacking. With regard to which household members benefit from the harvesting and consumption of wild foods, while we found three studies that examined children and young people's knowledge about wild plants (Zarger and Stepp 2004; Cruz García 2006; Wyndham 2010), their primary goal was to investigate knowledge transmission from elders to youth rather than to investigate consumption patterns and attitudes toward wild foods.

In this study we address gaps in wild food harvesting research through a case study working with Bribri people from the Talamanca Bribri Territory, Costa Rica. Although there is a body of literature describing some elements of Bribri forest food harvesting, information is lacking regarding people's consumption rationale, harvesting and consumption frequency, the mechanisms by which households access wild food, and generational consumption patterns within households.

Our case study is specifically relevant to forest management in Costa Rica. The Bribri Indigenous Territory was recently included in the large state protected area of La Amistad Biosphere Reserve and as a consequence the Bribri have

experienced restrictions on their access to forest resources (SINAC 2012; Sylvester *et al.* 2016b). Forest managers have expressed interest in ensuring the Bribri maintain access to cultural resources in forests, but they lack information on harvesting systems to enable them to do so (SINAC 2012). Our research provides information important to creating directives that respect people's access to wild food. Although our data are directly relevant to Costa Rica, forest managers elsewhere will find them useful. Specifically, forest managers can use our results to better understand the diversity of reasons why people use wild food, the extent of wild food use, the mechanisms of wild food access, and the social groups that can benefit from wild food harvesting.

Case Study Background

Bribri people have lived in and around the forests of the Talamanca region since time immemorial. There are currently an estimated 7,772 Bribri living in the Talamanca Bribri Indigenous Territory (Fig. 1), where we conducted our study (INEC 2013). In 1977, the government legally recognized 43,690 ha of Talamanca Bribri land and designated it La Reserva Indígena Talamanca Bribri; this Reserva overlaps with state managed protected areas including La Amistad International Park (Fig. 1). It is important to note that Bribri traditional lands comprise an area much larger than the government designated area. We use the term Bribri Territory to refer to the full extent of Bribri traditional lands in Talamanca.

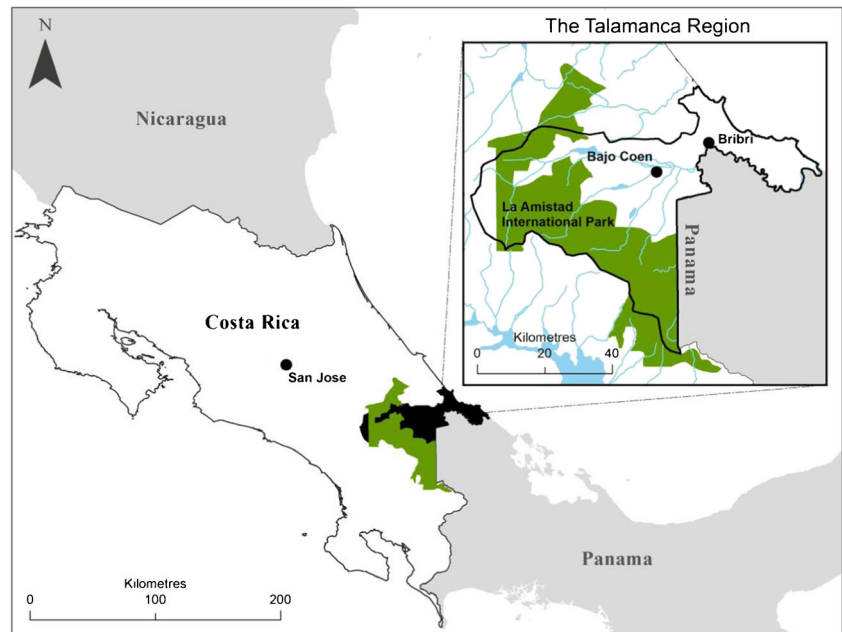
The Ethnoecology of Wild Food Harvesting in Forest Landscapes

Bribri wild food harvesting occurs in a diversity of land patches in farms and forests, e.g., farms used for market agriculture, home gardens, shifting agriculture fields, paths, forest margins, and forest interiors (García-Serrano and del Monte 2004; Sylvester and García Segura 2016). Wild foods are tended in spaces where they grow naturally, that is, according to the Bribri, provided by Sibö, the Creator, but are also transplanted from forest to farm patches where they can be tended to closer to people's dwellings (Sylvester and García Segura 2016). Wild food harvesting, like other harvesting activities, is regarded as important to keep the land alive since everything on the land has a purpose and things are kept alive by serving their purpose. One of the purposes of the land is to produce food. Therefore, people harvest and use wild foods the land produces to keep the land alive (*ibid.*).

Food Production Strategies

To gather data on access to, and use of wild species harvested from forests, we worked with the Bribri community of Bajo Coen, comprised of approximately 45 households located in

Fig. 1 The Talamanca Region, Bajo Coen community, and La Amistad International Park. (Justin Geisheimer)



Alto Talamanca. Like other communities in Alto Talamanca, Bajo Coen is a forest-dwelling community whose residents use forests for all aspects of their food systems (e.g., species, pollination inputs, fuel, and water for food preparation). Forests are also sites of shifting agriculture and other farming. The majority of Bajo Coen residents work in agriculture for export (bananas, plantains, cacao) and a few earn cash income as teachers and or labourers. During the time of our research organic banana cultivation was the main economic activity of most community members.

Bajo Coen, like other communities in Talamanca, has been exposed to market agriculture since the late nineteenth century (Villalobos and Borge 1998) when colonists sought to exploit the resource-rich Talamanca lands and the Bribri people for labour (*ibid.*). From the late 1800s to approximately 1935, the United Fruit Company (UFC) produced cash crops in Alto Talamanca, violently displacing Bribri residents from their land (Lansing 2014). After the UFC left, residents returned and continued to engage in the market economy mainly through cacao farming alongside other traditional forms of production (e.g., shifting agriculture, wild food harvesting).

In 2012, at the time of our research, the majority of residents engaged in multiple forms of food harvesting for household consumption, including: 1) cultivation for household consumption; 2) cash crops for local consumption and sale to national and international markets; 3) harvest of wild foods from farms and forests; and 4) purchase of foods from different sources (e.g., local producers, corner stores selling imported food, mobile food vendors, and stores located outside Bajo Coen). Participants reported that this combination of activities to acquire foods has been the norm for at least 50 years, although stores and imported foods have become more common. For instance, foods that people would travel

at least half a day to acquire in the past at a small store in Bambú, Talamanca, are now readily accessible in Bajo Coen.

La Amistad Biosphere Reserve and Bribri Access to Wild Food

In 1982, the state incorporated Bribri lands into the state managed protected area La Amistad Biosphere Reserve (hereafter La Amistad Biosphere; Morales *et al.* 1984). This is Costa Rica's largest protected area, containing its largest area of protected forests and some of the highest levels of biodiversity in the country (SINAC 2012; UNEP 2013; UNESCO 2014). Biosphere regulations ban shifting agriculture and heavily restrict hunting, thus negatively impacting Bribri wild food harvesting (see Sylvester *et al.* 2016b for greater detail) because hunting and harvesting wild edible plants are associated with shifting agriculture. Furthermore, hunting restrictions not only limit people's access to wild meat, they have led to negative impacts on health, the transmission of traditional knowledge, quality of life, cultural identity, and social cohesion and bonding (*ibid.*).

Research Partnerships

This project was proposed in 2009 and the research objectives and methodology developed from 2010 to 2012. In Bajo Coen, the primary author (Sylvester) collaborated with the Grupo de Mujeres *Sébliwak*, which is composed of nine females (including their male partners and families) and one male. To work with this women's group we developed a research partnership based on the Bribri concept of *ulàpeitök* (literally to lend (*peitök*) a hand (*ulà*)). This Bribri concept of sharing guided our development of a collaborative partnership with *Sébliwak* as a basis for the formulation of its goals

regarding: 1) the work needed to complete the project, 2) teaching and information sharing, 3) the benefits from this project.

Methodology

Information Gathering and Research Colleagues

We used participant observation observation, interviews, focus group discussions, and surveys to gather information on Bribri wild food harvesting. Our Bribri colleagues in Bajo Coen modified these tools to ensure we conducted research in a way respectful of Bribri values and ethics. We used household surveys to understand community-level patterns in wild harvesting. Sylvester created drafts of these surveys before moving to Bajo Coen, where after six months she refined these surveys with the help of four Bribri colleagues (Mr. Ancelmo Díaz, Mr. Hernan García, Ms. Sebastiana Segura, Mr. Juradir Villanueva). The final draft was reviewed in detail by two community Elders (Ms. Sebastiana Segura and Mr. Ancelmo Díaz) and one member of the local government (Mr. Juradir Villanueva).

Sylvester worked with Ms. Segura to invite households to participate in surveys. It is important to note the unique challenges with the household surveys compared to other data collection tools because they resembled state census tools (e.g., both require filling out questionnaires and a door to door approach), which have been used for unauthorized surveillance and to reinforce negative stereotypes of Indigenous peoples (Brant Castellano 2004). Sylvester and Ms. Segura worked to allay these concerns in detail before inviting people to complete surveys.

Based on Ms. Segura's local knowledge, she and Sylvester approached all households considered accessible (39 of 45 in the community); only 3 of households declined participation. Households decided who would respond to survey questions and these people ranged from 18 to over 70 years of age. A total of 18 women and 18 men were interviewed and surveys were completed during the months of October and November 2012.

The surveys included questions related to the following areas: 1) hunting and consuming wild meat, 2) harvesting and consuming wild plant foods, 3) wild resource sharing, and 4) gendered and generational harvesting; we also recorded descriptive variables about household members (e.g., demographic factors, employment). When households were asked about wild plant harvesting, we asked specifically about five representative wild food species (Fig. 2). Households were asked to recall all the animal species that were harvested within the last 3 months (Angelsen and Lund 2011). On November 14th, 2012, we carried out a group interview with four participants to verify identification of the species reported as hunted. All household surveys were anonymous.

Participant observation was undertaken to provide context for the household survey data (Urry 1999). Specifically, Sylvester

lived in Bajo Coen with a Bribri family and participated in her colleagues harvesting activities over 9 months (March–December 2012) and for a total of 2 weeks in 2013 in May and December. She also worked with the *Sébliwak* women's group at least 3–4 times per week. During this period she conducted interviews with her colleagues (aged from 18 to 68) relating to their daily activities, and 16 interviews with 12 community members (Table 1). Sylvester recorded field notes daily by hand and reviewed the themes and concepts with research colleagues in Bajo Coen to ensure accuracy.

We used semi-structured conversation interviews to respect participants' right to control what they wished to share (Kovach 2009). Interviews took place in participants' homes, during harvesting trips, or in locations of their choosing. An interview guide was used and questions related to interviewees' engagement in wild food harvesting, consumption, and food sharing.

Lastly, to extend understanding of young people's food consumption, we organized a traditional food workshop in partnership with local youth leader, Mr. Diego Morales, and community Elder, Mr. Ancelmo Díaz. The workshop, attended by 26 people, took place on 26 October 2012 at Coroma High school and focused on interactive activities related to Bribri food, including story telling by Elders, a show-and-tell about wild food, and a photography exposition.

Information Analysis

Qualitative coding was used to analyze information (Creswell 2014). All information (i.e., notes from participation in community activities, interview transcripts, and household survey data) were compiled and analyzed by hand. Qualitative codes were selected before reviewing data (i.e., a priori coding by topic) and corresponded to the sub-themes from the household surveys (i.e., harvesting and consuming wild plants, harvesting and consuming wild meat, harvesting groups, and sharing wild food). Data were reviewed and codes were assigned to relevant sections of text. A second, more in-depth coding process was performed on the same data to reveal themes not identified by the first. The final codes are: harvesting and consuming wild food, wild food consumption and life-stage, sharing and purchasing wild food.

There was one open-ended section of the household surveys that allowed participants to expand on the reasons they consume wild foods. We analyzed these data separately using *in vivo* codes (Ryan and Bernard 2003) (Table 2).

Research Ethics

Elders in the Bajo Coen community, the local government (*consejo de vecinos*), and the University of Manitoba Joint-Faculty Research Ethics Board approved of this study. The regional Bribri government (ADITIBRI) was informed of the Bajo Coen community representatives' decisions to

Fig. 2 The list of wild plants (*àr* in Bribri) in surveys: **a** *rpò* or *Cyathea* sp. fiddleheads, **b** balòkò or *Phytolacca rivinoides* leaves, **c** *yawö* or *Chamaedorea tepejilote* inflorescence, **d** *dikó* or *Bactris gasipaes* heart of palm and inflorescence, and **e** *sànalwö* or flowers of *Urera baccifera*. All are harvested from the wild except *Bactris gasipaes* (**d**), which is widely cultivated. All plants harvested by Ms. Sebastiana Segura and/or Mr. Sabino Díaz. Sylvester observed the use of 10 wild plants during 2012 (Sylvester and García Segura 2016). Participants reported the use of more than these 10 wild species, but they were not observed to identify their scientific names. (O. Sylvester)



participate in this research. All research colleagues provided their ongoing, informed consent and chose to have their names beside the insights they shared.

Results

Harvesting and Consuming Wild Food

Hunting was an important activity to acquire wild meat: 53 % of households reported hunting and 61 % of households reported having a member skilled at hunting (19 households; Fig. 3). Of the 19 households that reported hunting, 11 reported males as the primary hunter. The other hunting households described hunting as follows: 1) an older and a younger male, 2) a female and male, and 3) family groups (mixed gender).

Hunting was described as a subsistence activity for household consumption. Households reported a range of reasons for eating wild forest meat including: flavour, nutritional value, association with traditions and Bribri identity; these reasons were not mutually exclusive (Table 2). Dogs and rifles were used to hunt mammals. Participants reported training dogs to hunt specific wild animals.

Households reported a total of 32 species of birds and mammals that are hunted for food and recalled hunting 15 of those species in the preceding 3 months (Table 3). What people most commonly hunt reflects a combination of species availability, the skills of hunters and the efficiency of their dogs. The reasons households reported for not hunting (47 %) include: 1) no rifle or hunting dog, 2) observance of protected area hunting regulations, often referred to as the

hunting law (*la ley de la cazeria*), 3) lack of time/ability to get out on the land, and/or 4) no trained hunters in the household.

All households reported eating wild meat; however, the frequency of wild meat consumption was difficult to quantify (Fig. 4) because people's access to wild meat depended upon many external factors including access to the means to hunt, interactions with people who share meat, and/or having the time to hunt. This was reflected in survey responses: 67 % of households reported they ate wild meat whenever it was available; 8 % reported eating wild meat once every 2 weeks; 8 % once a month; 11 % once every 3 months; and 6 % were unsure.

All households reported harvesting and consuming a variety of species of wild plant foods (Table 4). Specifically, household heads described eating wild plants because of their flavour, nutritional value, association with traditions and Bribri identity, medicinal value, as well as their availability when other foods are lacking (Table 2). The majority of households reported harvesting in family groups (58 %); other households reported going with their life partner (14 %) or alone (males 20 %; females 8 %).

Wild plant foods are harvested and consumed as a complement to Bribri diets, and harvesting frequency commonly depends on how often people go out on the land or when these plants were available via food sharing. Some Elders described changes in the frequency of eating wild plants and provided examples of wild plants that are no longer commonly harvested (e.g., Ms. Anastasia Segura, Mr. Euterio Mayorga, and Mr. Ancelmo Díaz). However, despite changes in food consumption, all households reported that wild foods continue to be important (e.g., *Cyathea* sp.; Table 4).

Table 1 List of Bribri research colleagues with associated interview dates (Sylvester)

Name	Affiliation	Interviews
Mr. Miguel Angel		20/10/12
Ms. Ana Griselda Díaz	<i>Sébliwak</i> women's group	05/11/12, and group interview 14/11/12
Mr. Anselmo Díaz	–	23/06/12 and follow up interviews on 29/06/12 and 15/08/12
Mr. Gabriel Díaz	–	07/08/12
Mr. Sabino Díaz	<i>Sébliwak</i> women's group	Group interviews on 26/03/12, 14/11/12
Mr. Adenil García	<i>Sébliwak</i> women's group	–
Mr. Hernán García	<i>Sébliwak</i> women's group	Group interviews on 14/07/12 and 31/08/12, and 14/11/12
Ms. Alejandra Hernández	<i>Sébliwak</i> women's group	–
Ms. Karen Hernández	<i>Sébliwak</i> women's group	20/7/12
Ms. Nimfa Hernández	<i>Sébliwak</i> women's group	21/04/2012
Mr. Saul Lek	<i>Sébliwak</i> women's group	–
Mr. Euterio Mayorga	–	09/08/2012
Ms. Ana Yorleni Morales	<i>Sébliwak</i> women's group	09/11/12
Ms. Vicenta Morales	<i>Sébliwak</i> women's group	–
Mr. Bernardo Sánchez	<i>Sébliwak</i> women's group	–
Mr. Rudy Sánchez	–	28/08/12
Ms. Anastasia Segura	–	–
Ms. Sebastiana Segura	<i>Sébliwak</i> women's group	29/04/12, and group interviews on 26/03/12, 14/07/12, and 31/08/12, 14/11/12
Mr. Juradir Villanueva	Resource guard, member of the Bajo Coen community council	01/11/2012

Wild Food Consumption and Generation Preferences

The majority of households (94 %) reported that all members eat wild meat when it is available, and these households reported members from 0 to 19 years of age. Only two households reported that their younger members do not eat wild

meat. All but two households reported that all members eat wild plants including youth. Some participants noted that bitter plants are consumed only by members with an acquired taste (e.g., *Chamaedorea tepejilote*; Fig. 2, Table 4).

During the traditional food workshop 26 youth discussed their wild food consumption. All described consuming wild plants and all but one described eating wild meat. Some reported that although they may not eat wild food at their home, they do so at Elders' or their relatives' homes. Wild foods commonly mentioned as preferred include but are not limited to: 1) fiddlehead ferns (*Cyathea sp.*; Table 4), 2) collard peccary (*Tayassu tajacu*; Table 3), and 3) paca (*Agouti paca*; Table 3).

When asked about wild food consumption, youth often expanded in wider discussions about how wild foods related to their relationship with, and appreciation of Bribri culture. Eighteen-year-old Mr. Gabriel Díaz, for instance, stated:

I think continuing all of that is important, food, like *ar* [wild edible plants], our traditions, the language, because we are made up of all these things, we are Indigenous people and that is where we come from. Food for me is important because we do not know what canned beans or tuna from the corner store are; what we know comes from here and because of that I am proud to eat it. Other youth are embarrassed or do not like to eat food from here, food from the forest, and they do not even want people to know they are Indigenous; they only want to associate themselves with outsider things (07 August 2012).

On the other hand, some youth shared why wild food consumption may be discouraged. For instance, some youth talked about their concerns that members of their community are shifting towards a diet dominated by foods that are highly processed and/or purchased from imported sources. A number of our research colleagues suggested these dietary shifts are the result of a belief that outsider food systems (and food sources) are superior to those of Bribri people.

Parents and elders explained the importance of youth's exposure to wild species in the field and in household diets; this exposure is important not only to pass on Bribri cultural teachings, but also so youth have knowledge about wild edible foods at times of food scarcity. Although the majority of participants that are parents reported consuming wild plants and meat, some parents reported that consuming wild food can be challenging due to lack of access to harvesting areas, lack of time to harvest, and/or changes in people's food preferences.

Sharing and Purchasing Wild Food

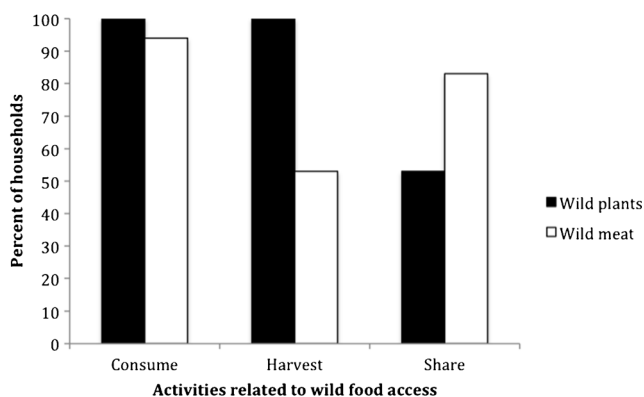
Sharing food is part of a Bribri concept, *i tchabé tók*, that teaches generosity regarding food (Sylvester *et al.* 2016a), and is central to daily life. The majority of households

Table 2 Data from open-ended questions in household surveys (Sylvester)

Reasons people eat wild plants or meat	Representative quotes from participants
Nutrition and health	When Elders eat <i>âr</i> [edible wild plants] they live long and maintain good dental health (household 1, male, aged 60). Wild meat is natural and doesn't do any damage to your body because the animals eat only natural things and do not eat animal feed (household 6, female, 23 years old)
Tradition and teaching from the Creator	<i>Sibö</i> [the Creator] left us <i>âr</i> and wild meat because he knows it is good for our health (household 11, male, aged 50) Since I was young my grandparents taught us to eat this way, I became accustomed to it (household 31, male, aged 29)
Identity	Forest food is something that is intrinsically linked to being indigenous (household 35, female, 40 years old).
Flavour and variety	Wild meat is delicious and it gives us something different to eat other than just chicken or pig (household 23, female, aged 29). It is natural, since I was young my grandparents always taught us to <i>âr</i> and it gives us something different than the day-to-day food (household 27, male, aged 65).
Lack of other resources or resource safety net	When there is no other meat we can go to the forest and it helps us when there is a meat shortage (household 10, female, aged 47). Here we never go hungry, if there is no meat we go to the forest and we get heart of palm or any <i>âr</i> (household 3, female, aged 47).

reported sharing as a way to access wild food, generally more for meat than edible plants (Fig. 3). Sharing either prepared or unprepared wild foods takes place among neighbouring communities, but is more common among residents in the same community.

Although the sharing ethic applies to all foods, it is critical for some people to access some wild species for which they lack the skills, time or equipment to harvest. Fiddlehead ferns, for example, grow where there have been recent land disturbances, so only those who frequently visit the forests or shifting cultivation fields where they grow will be aware of their presence. Some wild species are reported to be locally rare and consequently harvested infrequently or only in small quantities; thus, sharing can be critical for some households to gain access these species.

**Fig. 3** Activities related to wild food in Bajo Coen ($N = 36$ households; Sylvester)

Sharing wild foods can also be important for user groups that have impediments to their access. In Bajo Coen, some of our female colleagues described limited opportunities to harvest wild species due to household and work responsibilities, such as working in agricultural fields (for household consumption and for sale), tending livestock, cooking (both household and in community schools), caring for young children, and attending to visitors. On any given day a woman might be responsible for all of these activities.

Elders also reported limited opportunities to harvest wild food, primarily because of physical health challenges (e.g., Mr. Euterio Mayorga and Ms. Anastasia Segura). A young hunter, Mr. Rudy Sánchez, described how sharing meat is important for Elders. Specifically, he explained that his family makes sure to bring wild meat to his grandmother both for her enjoyment and for her to share with other people (28 August 2012). Ms. Sebastiana Segura also pointed out that as some community Elders do not eat imported meat, such as factory farmed chicken brought into her community for sale, thus wild meat can provide Elders dietary variety and nutrients they may not obtain otherwise (29 April 2012).

Lastly, some younger participants reported challenges to accessing wild foods including: 1) a lack of opportunities to harvest (due to work or school responsibilities), 2) observance of protected area regulations, and 3) lack opportunities to learn how to harvest wild species. Mr. Gabriel Díaz Morales reported that he learned to eat wild foods from his grandmother sharing Bribri meals with him. He attends school outside of Bajo Coen where he does not eat wild food, and has no time to harvest when he comes home on the weekends (07 August 2012). Three

Table 3 Species reported as hunted for food and the proportion of households hunting them from August–October 2012 ($N=36$; Sylvester)

Bribri name	Scientific name (family)	Common Name	% Households consuming over preceding 3 months
Mammals			
<i>Káno'</i>	<i>Cuniculus paca</i> L. (Cuniculidae)	Paca	25
<i>Sar</i>	<i>Allouata palliata</i> Gray (Atelidae)	Mantled howler monkey	3
<i>Sinà sarùrù</i>	<i>Bradypus variegates</i> Schinz (Bradypodidae)	Brown-throated three-toed sloth	8
<i>Sinà tsikirirì</i>	<i>Choloepus hoffmanni</i> Peters (Megalonychidae)	Hoffmann's two-toed sloth	8
<i>Tsawì</i>	<i>Dasyypus novemcinctus</i> L. (Dasypodinae)	Nine-banded armadillo	14
<i>Shùlè</i>	<i>Dasyprocta punctata</i> Gray (Dasypodidae)	Agouti	14
<i>Namù dalòlò</i>	<i>Herpailurus yagouaroundi</i> Geoffroy Saint-Hilaire (Felidae)	Jaguarundi	3
<i>Sùlì màt</i>	<i>Mazama americana</i> Erxleben (Cervidae)	Red brocket	6
<i>Tsí</i>	<i>Nasua narica</i> L. (Procyonidae)	White-nosed coati	8
<i>Sùlì</i>	<i>Odocoileus virginianus</i> Zimmermann (Cervidae)	Whitetail deer	
<i>Káchu'</i>	<i>Potos flavus</i> Schreber (Procyonidae)	Kinkajou	3
<i>Skula'</i>	<i>Proechimys semispinosus</i> Tome (Echimyidae)	Tome's spiny rat	3
<i>Skó baté</i>	<i>Sciurus variegatoides</i> Ogilby (Sciuridae)	Variiegated squirrel	3
<i>Sawë</i>	<i>Sylvilagus brasiliensis</i> L. (Leporidae)	Forest rabbit, Tapeti	3
<i>Urrì</i>	<i>Tamandua mexicana</i> Saussure (Myrmecophagidae)	Northern tamandua	
<i>Nai'</i>	<i>Tapirus bairdii</i> Gill (Tapiridae)	Baird's tapir	
<i>Kásir</i>	<i>Tayassu tajacu</i> L. (Tayassuidae)	Collard peccary	39
Reptiles			
<i>Sùlìchabè</i>	<i>Boa constrictor</i> L. (Boidae)	Boa constrictor	
<i>Talók kuè</i>	<i>Chelydra rossignoni</i> Bocourt (Chelydridae)	Central American snapping turtle	8
<i>Buà</i>	<i>Iguana iguana</i> L. (Iguanidae)	Green iguana	
Birds			
<i>Duwè</i>	<i>Crax rubra</i> L. (Cracidae)	Great curassow	
<i>Manòsh</i>	<i>Ortalis cinereiceps</i> J. E. Gray (Cracidae)	Gray-headed chachalaca	
<i>Kaè</i>	<i>Penelope purpurascens</i> Wagler (Cracidae)	Crested guan	
<i>Kayò</i>	<i>Pionus menstruus</i> L. (Psittacidae)	Blue headed parrot	
<i>Kayò</i>	<i>Pionus senilis</i> Spix (Psittacidae)	White-crowned parrot	
<i>Bitsík</i>	<i>Pteroglossus torquatus</i> Gmelin (Ramphastidae)	Collard aracari	
<i>Tsiö</i>	<i>Ramphastos sulfuratus</i> Lesson (Ramphastidae)	Keel-billed toucan	
<i>Urèk</i>	<i>Ramphastos swainsonii</i> Gould (Ramphastidae)	Chestnut-mandibled toucan	
<i>Kóli tsiö</i>	<i>Selenidera spectabilis</i> Cassin (Ramphastidae)	Yellow-eared toucanet	
<i>Tsurìrèrè</i>	<i>Tinamus major</i> Gmelin (Tinamidae)	Great tinamou	

female household heads noted that shared wild foods increase opportunities for youth to be exposed to these foods. This exposure was reported to be especially important for foods that are either locally rare or rarely harvested (Ms. Sebastiana Segura, Ms. Nimfa Hernández, Ms. Karen Hernández).

The sale of wild food was not observed in Bajo Coen during the 9 months of Sylvester lived there, and neither sales nor purchases of wild food were recorded in the household surveys. However, one colleague mentioned purchasing locally hunted wild meat for family consumption. There were no reports of sale or purchase of wild edible plants.

Although wild food markets are not common in Bajo Coen, colleagues reported that outsiders harvest species from Bajo Coen

and sell them in nearby towns, notably in Bribri, the largest commercial center in Talamanca Bribri Territory. At the time of this research, there was a reported demand in Bribri for tepezcuintle meat (*Agouti paca*) and fiddlehead ferns (*Cyathea sp.*).

Discussion

Many anthropologists, ethnobiologists, and nutrition scholars have studied forest food harvesting focusing on 1) species use (Ladio and Lozada 2004; Tardío *et al.* 2005; Altrichter 2011), 2) cultural knowledge related to these species (Bye 1981; Posey *et al.* 1984; Turner and Clifton 2006), 3) behavioural ecology

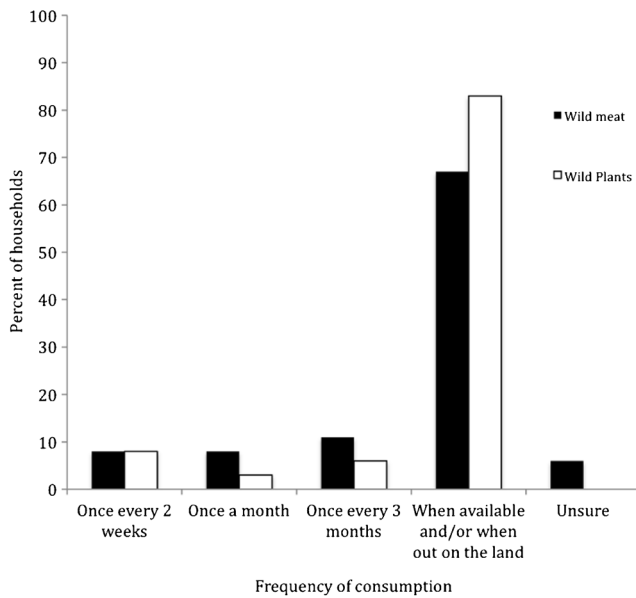


Fig. 4 Frequency of household consumption of wild meat ($N=36$ households; Sylvester)

of foraging (Kaplan *et al.* 1984; Hames 2000; Gurven 2004; Gurven *et al.* 2001, 2004), and 4) wild food nutrition (Grivetti and Ogle 2000; Fa *et al.* 2003; Johns and Maundu 2006; Golden *et al.* 2011; Powell *et al.* 2013). For contemporary forest-dwelling societies, we are missing information regarding: 1) emic perspectives on wild food consumption, 2) the extent and frequency of wild food harvesting and consumption, and 3) wild food consumption patterns of younger generations. Our case study in Bajo Coen, a Bribri forest dwelling-community, addresses this imbalance.

Wild Food Harvesting and Consumption

Our research confirms that although wild foods are important to people living in and around forests, they may not be

consumed often (Sylvester and Avalos 2009; Altrichter 2011; Powell *et al.* 2013). This has led some scholars to conclude that these foods are important mainly as safety nets when other food is not available, i.e., famine foods (Etkin 1994; Grivetti and Ogle 2000). This has also resulted in scholarly discourses that suggest wild foods are commonly used by the economically marginalized and/or those who experience seasonal scarcity (Annegers 1973; Zinyama *et al.* 1990; Senaratne *et al.* 2003; Delang 2006).

Our research contributes to a handful of studies that report on the rationale for wild food consumption beyond famine or economic marginality (Etkin 1994; Somnasang and Moreno-Black 2000; Power 2008). Our research colleagues explained how consuming wild food is closely linked to: 1) nutrition and health, 2) teachings from *Sibö* (the Creator), 3) cultural identity, 4) flavour and a preference for dietary variety, and 5) food safety nets. In a small number of studies scholars have also reported different combinations of these elements (Somnasang and Moreno-Black 2000; Power 2008). Documenting a broader perspective on the multiple reasons wild and traditional foods are important for indigenous peoples is important to move beyond narrow understandings of wild foods as famine foods and to accurately describe people’s relationships with their environments since wild foods are linked to cultural identity and thus people’s right to adequate, and culturally appropriate food (Damman *et al.* 2008; Sylvester *et al.* 2016b).

Researchers have reported that Indigenous peoples are undergoing nutritional transitions whereby traditional foods are rapidly being replaced with imported processed foods (Damman *et al.* 2008). This is a concern of many community members of all generations in Bajo Coen. Members of the older generation reported dramatic increases in the availability of imported foods (e.g., sugar, salt) over the past 50 years. Even meat and grains that in the past were produced locally are now produced on industrial farms and are imported on a

Table 4 Percent of households consuming a select group of wild edible plants (see Fig. 1) (Sylvester)

Bribri name	Common name English	Scientific name (family)	Plant part consumed	% Households consumed this species	Notes	Other uses of the plant
<i>Dikórpó</i>	Heart of palm	<i>Bactris gasipaes</i> Kunth (Arecaceae)	Heart of palm	100		Construction, medicine
<i>Yawö</i>		<i>Chamaedorea tepejilote</i> Liebm. (Arecaceae)	Inflorescence	92	This species is bitter and households reported consumption only by members that enjoy bitter tastes	Medicine
<i>Rpò</i>	Fiddleheads	<i>Cyathea</i> sp. (Cyatheaceae)	Fiddleheads	100	All households reported that youth eat this species	
<i>Balòkò</i>		<i>Phytolacca rivinoides</i> L. (Phytolaccaceae)	Leaves	97		
<i>Sànalwö</i>		<i>Urera baccifera</i> (L.) Gaudich. ex Wedd. (Urticaceae)	Flowers	86		Medicine

regular basis. These imported food are also served at community schools through state-sponsored programs.

Despite the increased availability of imported foods, our findings illustrate that households in Bajo Coen highly value wild foods and their consumption is widespread. This continued use of wild food, despite nutritional transitions, is due in part to people's special relationships with wild food (e.g., Table 2) and because wild food harvesting is central to many aspects of daily life (e.g., social bonding and cohesion, connecting with the land and non-human beings).

Wild Food Consumption and Generation

We found members of all generations consume wild foods for taste cultural identity, and health. Scholars have suggested that younger generations lack interest in wild or traditional foods for a number of reasons, including changing food preferences, loss of knowledge about traditional foods, and/or stigmas associated with traditional foods (e.g., Shava 2000; Dweba and Mearns 2011). Nevertheless, our results show that there are young people in all households that consume and harvest wild food, and that some choose wild food in part due to their appreciation of Bribri culture.

When members of different generations are exposed to wild food and/or engage in harvesting and preparation, knowledge about these foods is acquired (Ruddle and Chesterfield 1977). Some participants noted barriers to this exposure (either to harvest or to access knowledge to harvest or prepare foods; see also Shukla and Sinclair 2009). Thus, programs directed at supporting young people's continued access to wild food should be designed to work with all generations, i.e., with teachers as well as learners (e.g., Turner and Thompson 2006).¹

Sharing and Purchasing Wild Food

There is a body of behavioural ecology literature that quantitatively analyzes factors that shape the dynamics of food sharing in forest dwelling societies; these studies have illustrated how: 1) sharing is correlated with a few variables (e.g., kinship and household proximity; Gurven *et al.* 2001); 2) people who forage together also share food (Gurven *et al.* 2004); 3) people tend to share forest food with a few families rather than widely or randomly (Hames 2000; Gurven *et al.* 2001, 2004; Gurven 2004); and how 4) contingency (giving that is conditional upon past or future reciprocation) is not strongly correlated with sharing food (Gurven *et al.* 2001). Nevertheless, data are still lacking on: 1) emic descriptions of how and why wild food is shared; 2) how people of different genders and generations benefit or not from food sharing;

and 3) the role of food sharing in contemporary forest-dwelling societies.

Our results support earlier findings that sharing is an important pathway for many households to access wild food, especially wild meat (e.g., Kaplan *et al.* 1984; Hames 2000; Gurven *et al.* 2001, 2004; Gurven 2004). Our results also show how sharing can be important for different reasons for different generations. Elders, for instance, report physical limitations on foraging; women's work is often focused around their dwellings; and youth can be constrained by schoolwork and chores as well as lack of opportunities to forage and hunt with skilled harvesters.

The majority of Bajo Coen residents work in agriculture for their primary cash income (92 % of households surveyed), primarily bananas and plantains grown in the lowlands, and all households earn a portion of their cash income from agriculture. Working in agriculture and other jobs has implications for where people spend their time and what foods they commonly access. Bribri agricultural plots are often polycultures (Borge 2011; Sylvester and García Segura 2016) and offer access to many wild plants. However, engagement in market agriculture can limit the time available to spend foraging, hence the importance of sharing.

It is not common for Bajo Coen residents to purchase wild food but its forests supply an outsider market for wild species (see also Suarez *et al.* 2009; Sylvester and Avalos 2009). The currently unknown impacts of these markets on Bribri harvesting and food access merit further investigation.

Lastly, our research highlights that emic perspectives are important to understand why people share wild resources. We noted above that sharing food is part of a Bribri concept of generosity (see also Sylvester *et al.* 2016a) and that participants reported that sharing was important for community members who have limited opportunities to hunt and forage. These findings can contribute to expand existing quantitative behavioural ecology models that seek to better understand why people engage in forest food sharing.

Limitations of this Research

It was difficult to document the frequency of wild food consumption through household surveys. People most commonly reported consuming wild plants and animals when they were available. Participation was crucial to understand the many factors that shape access and availability of wild food, including relationships with non-human beings, health, work, school and time constraints, and/or access to rifles or dogs, enabling us to triangulate our data as well as to enrich the understanding of short responses provided in household surveys.

More nuanced consumption frequency data could also be gathered through techniques that allow each household to document their own wild species consumption over an extended period of time; one reviewer also suggested that

¹ For example, in 2012, Bribri youth in Bajo Coen designed such a program regarding medicinal plant knowledge.

nanced frequency data could be recorded by scheduling 24 h recalls with participants. Similarly, participants could record their own logs about wild food consumption. The latter could be challenging in cases where harvesting restrictions and/or negative stigmas about wild food consumption exist.

Additionally, because survey respondents were household heads, it is possible that younger generations' consumption patterns are misrepresented (see also Pfeiffer and Butz 2005). Younger household members volunteered to respond to survey questions 26 % of the time and some were present when we carried out surveys. However, to ensure we represented youth's views we had to supplement surveys with other methods, e.g., individual interviews and discussions during a traditional food workshop.

Directions for Future Research

One area for future research relates to better understanding intra-household diversity regarding wild food consumption and access. Elsewhere we have documented some of differences among women regarding their access to wild food (Sylvester *et al.* 2016a). However, further in-depth analysis of differences among young people or among members of other social groups is needed. Documenting intra-household diversity will help the design of programs that better promote young people's continued access to traditional food.

Lastly, to develop future research on this topic and to compare results of our work to those of others, a framework for analysis is needed. We used household surveys, workshops, semi-structured interviews, and participation to understand basic consumption and harvesting patterns at in one forest-dwelling community. Our work is unique because our research methods were developed with the guidance of our Bribri research colleagues on how to best approach our basic questions about forest food harvesting. For instance, we did not plan to conduct a workshop on traditional food consumption but did so at our colleagues' recommendation (see also Kovach 2009; Tuhiwai Smith 2012[1999]). As our research illustrates, developing these methods can be context specific. At the same time, we found it helpful to start with general tools to gather information about wild foods (e.g., household surveys) and to modify these tools based on the advice of our research colleagues.

Conclusions

The research presented here addressed four aspects of wild food harvesting: 1) reasons for consumption; 2) harvesting and consumption frequency; 3) generational consumption, in particular the younger generation; and 4) mechanisms of accessing wild food. Our results confirm previous findings that wild foods harvested from forests are not consumed often (e.g., Powell *et al.*

2013). At the same time our findings provide new information on the extent of wild food consumption by households and by generation and the frequency of, and rationale for, wild food sharing. Specifically, we found that all households and members of all generations consume both wild plants and wild meat and that variation in species consumption depends upon personal taste preferences. Our finding that members of all generations consume wild food diverges from the widely held assumption that younger people do not commonly eat traditional food (Shava 2000; Dweba and Mearns 2011). Furthermore, that all households consume wild food is an important finding in light of the increase in nutritional transitions in traditional societies worldwide (Damman *et al.* 2008; Kuhnlein *et al.* 2013).

We found that wild food use is commonly linked to identity, health, flavour preferences, dietary variety, and teachings from the Creator (*Sibö*). The majority of published literature on wild food focuses on its nutritional or economic value and consequently the many other cultural rationales for wild food use remain less visible. To better inform forest management policy we encourage more research on the cultural values of wild food consumption to ensure these values are respected.

Also relevant to forest management is our finding that the number of households that harvest wild species does not necessarily reflect the number of households that benefit from wild species use; this is because although not all people hunt and harvest they are able to access wild species through sharing networks. Our results clearly indicate that when creating forest management directives forest managers should consider the cultural alongside the nutritional or economic value of wild food. A focus on the entire harvesting system is important to design policies that respect wild food access for all community members.

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